Low Cost Carbon-Carbon Rocket Nozzle Development, Phase I

Completed Technology Project (2011 - 2011)

Project Introduction

This development will provide an inexpensive vacuum nozzle manufacturing option for NOFBX

TM

monopropellant systems that are currently being developed under NASA SBIR funding. NOFBX

TM

is non toxic and utilizes a much simpler monopropellant feed system architecture. Furthermore NOFBX

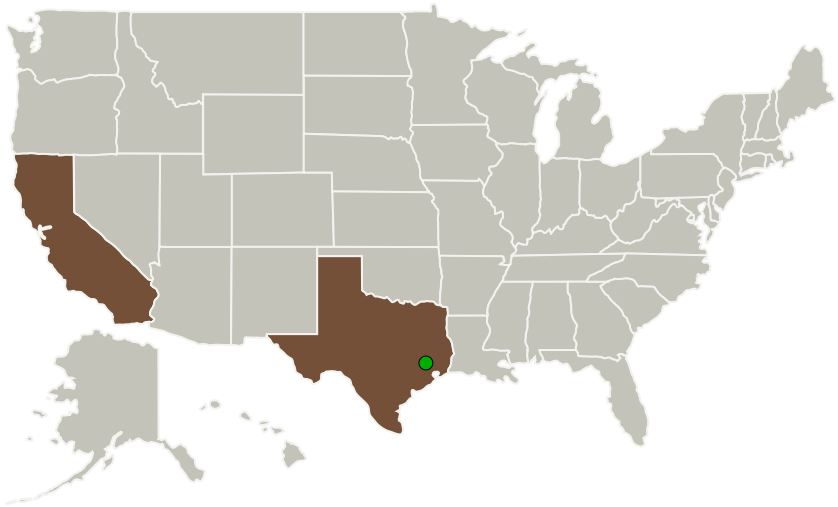
TM

meets the criteria for a non-toxic propellants that will meet NASA's performance targets (as indicated by high specific impulse and high specific impulse density) while improving safety and reducing handling operations as compared to current state-of-the-art hydrazine-based propellants. During the proposed effort we will develop CC composite in-space nozzles for use on 100lbf class NOFBX

TM

thrusters. We have built the first CC composite rocket nozzle prototype that does not require autoclaving or CVD/CVI processes. In fact our process is more akin to typical carbon fiber lay-up standards than that of typical CC composites manufacturing methods.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
Firestar Engineering, LLC	Lead Organization	Industry	Mojave, California
Johnson Space Center(JSC)	Supporting Organization	NASA Center	Houston, Texas

Primary U.S. Work Locations	
California	Texas

Project Transitions

February 2011: Project Start

September 2011: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/138263)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Firestar Engineering, LLC

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Greg S Mungas

Co-Investigator:

Greg Mungas

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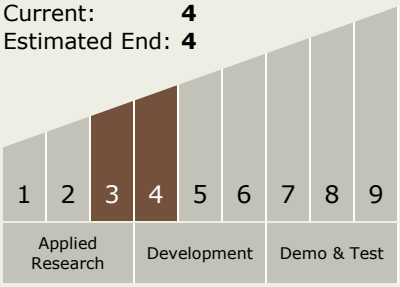
Technology Maturity (TRL)

Start: **3**
Current: **4**
Estimated End: **4**



Technology Areas

Primary:

- TX01 Propulsion Systems
  - TX01.1 Chemical Space Propulsion
    - TX01.1.3 Cryogenic

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System